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(71) Applicants

Royston Francis Allen,  
353B Capthorne Court, Alexandra Avenue, South  
Harrow, Middlesex.  
Janos Kecskes,  
353B Capthorne Court, Alexandra Avenue, South  
Harrow, Middlesex

(72) Inventors

Royston Francis Allen  
Janos Kecskes

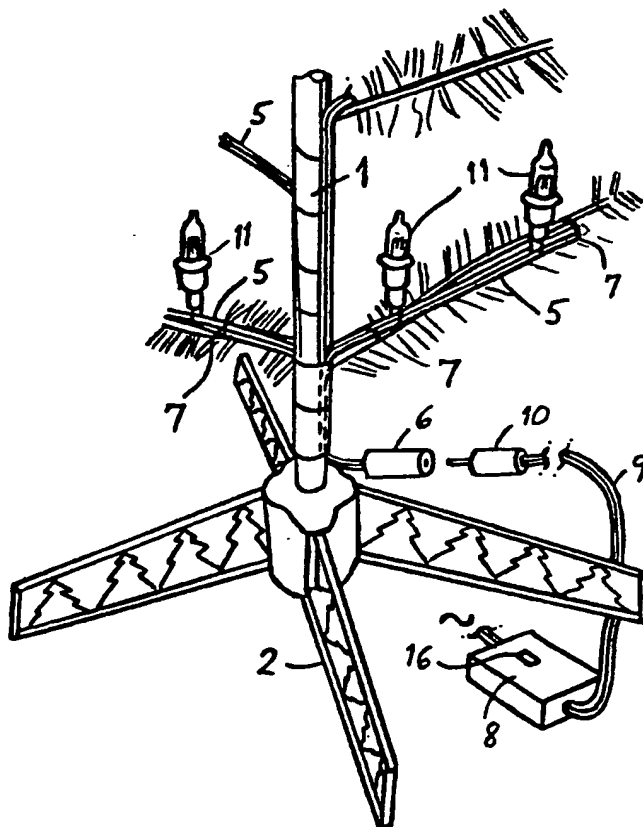
(74) Agent and/or Address for Service

Baron & Warren,  
18 South End, Kensington, London W8 5BU

(54) Lighting system for trees or plants

(57) A safety lighting system for a tree or plant; such as an artificial Christmas tree (1), comprises a wiring harness consisting of a plurality of parallel-connected pairs of insulating conductors (5) respectively extending along and assembled to at least some of the branches of the tree, and a plurality of low-voltage (6 or 12 volt) electric bulbs (11) of which the contacts are detachably connected to the respective conductors of a pair along a branch either directly or via complementary lamp sockets disposed along the branches. The harness is fed with low-voltage current from a mains transformer (8) provided with an overload cut-out (16).

Fig.2



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Fig.1

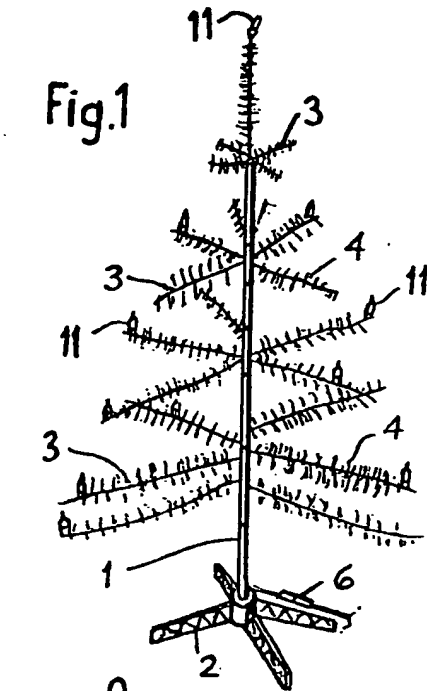


Fig.2

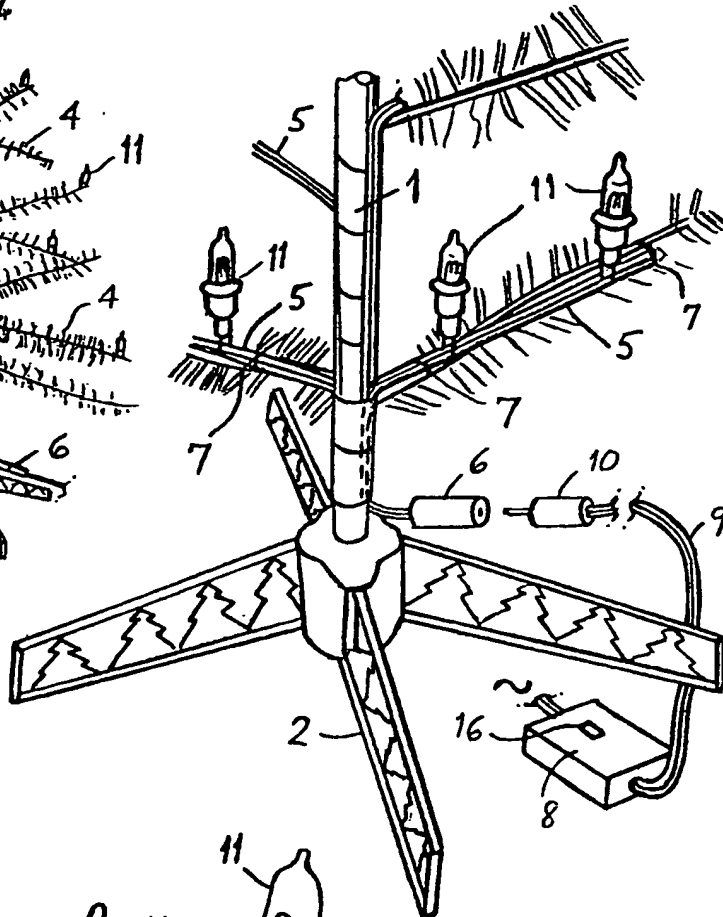


Fig.3

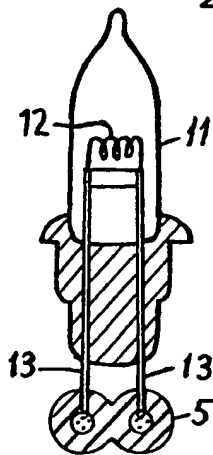
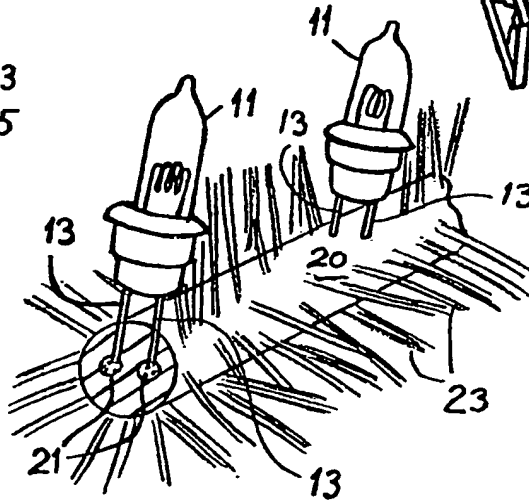
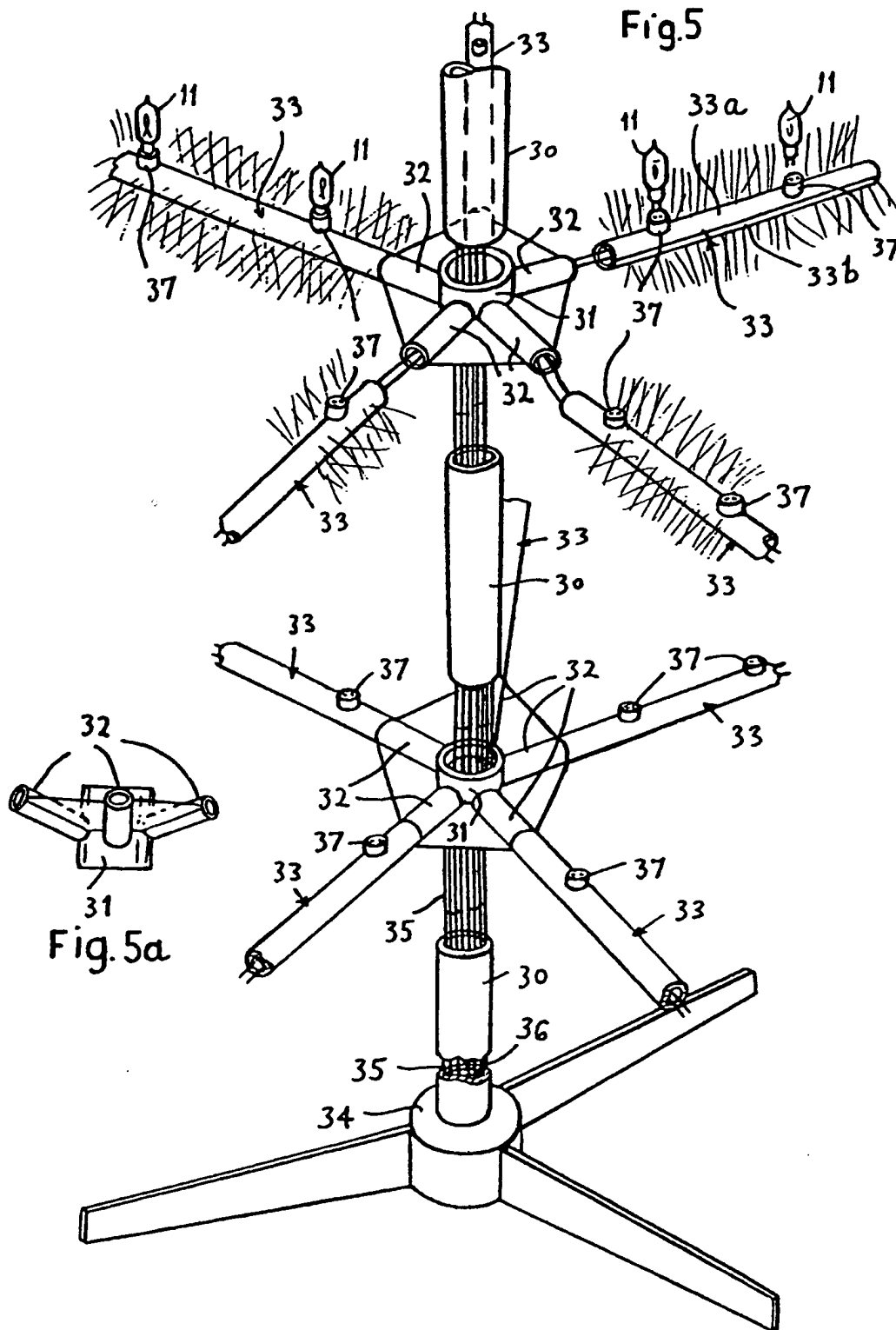


Fig.4





## SPECIFICATION

## Lighting system

- 5 The invention relates to a lighting system for natural and artificial trees or plants, such as Christmas trees, which are illuminated by an array of electric light bulbs distributed throughout the branches of the tree or plant.
- 10 Domestic Christmas trees are conventionally decoratively illuminated by a string of low-voltage bulbs connected in series at spaced locations along a cable or flex connected to a mains plug, for example twenty series-connected 12-volt bulbs in the case of a 240-volt mains supply, the cable or flex being draped over the branches of the tree with the individual bulbs positioned to provide a desired decorative effect. In the case of a large tree
- 20 two or more strings of bulbs are necessary to achieve adequate coverage of the tree by the lighting system.
- Such lighting systems necessitate that the Christmas tree be re-draped each year on a
- 25 new natural tree or on a new or re-erected artificial tree, and to be removed and stored at the end of the festive season. These operations can not only be tiresome but also involve risk of electric shock from the mains supply voltage. The use of mains voltage also presents the risk of fire. If one of the series-connected bulbs should burn out, all the bulbs of the string will fail to light and it is often a time-consuming and irritating job to
- 35 locate and replace the faulty bulb. Some lighting systems overcome this last problem by including means so that only the faulty bulb of a string goes out, but such systems are not completely reliable and the cutting out of circuit of the faulty bulb increases the voltage drop across the bulbs of the string which remain illuminated with the risk of further bulbs burning out.

The object of the invention is to provide a

45 lighting system which overcomes the above drawbacks of existing systems.

- The invention consists in a lighting system for natural and artificial trees or plants including a wiring harness comprising a plurality of
- 50 parallel-connected pairs of insulated conductors respectively extending along and secured to, wound around, woven in with, moulded in, enclosed within or otherwise assembled to at least some of the branches of the tree or plant, in combination with a plurality of low-voltage electric bulbs of which the contacts are detachably connected to the respective conductors of a pair along a branch either directly or via complementary lamp sockets
- 55 disposed along the branches.

- The harness is fed with current via the common input from a low voltage source, preferably by a step-down transformer from the mains supply. A battery may alternatively
- 65 be used. By "low-voltage" is meant a voltage

- which is incapable of producing an electric shock, such as 12 or 6 volts. The supply source should provide a limited current output to reduce the risk of fire, and may include a
- 70 resettable cut-out to take care of any overload or short-circuit which may arise, for example, when piercing the leads with the conductor pins of a bulb.

- In one embodiment the wiring harness comprises a plurality of electric leads each comprising two elongate conductors insulated from each other by being located in substantially uniformly spaced-apart relation by a covering of insulating material, the two conductors of the respective leads being connected in parallel with each other to a common input and the respective leads extending along and being secured to, woven in with, moulded or enclosed within, or otherwise assembled to at least some of the branches of the tree or plant, and the filaments of the low-voltage electric bulbs are connected across pairs of conducting pins which are adapted to pierce the insulating covering or be inserted through or into pre-formed openings or sockets therein to make electric contact with the pairs of conductors of the leads at desired locations on the tree or plant.

- In another embodiment, the trunk or stem of an artificial tree or plant comprises a plurality of lengths of tube, which are assembled end-to-end, one above the other, by tubular connector sockets having a plurality, conveniently five, of smaller branch sockets projecting generally radially therearound, and preferably slightly upwardly, into which further tubular members are inserted to form the branches of the tree or plant. Each pair of conductors, which may be formed of individual insulated
- 95 wires or a composite insulated wire, is threaded up the trunk or stem tube and out through different smaller branch sockets into respective tubular branches. Each tubular branch may be assembled in two halves to
- 100 facilitate connecting the conductors to the contacts of a lamp carried by the tubular branch.

- The invention also consists in a set of parts comprising a harness and low-voltage bulbs, optionally with a low voltage transformer or battery, for equipping a tree or plant with the lighting system of this invention.

- In order that the invention may be more clearly understood, reference will now be made to the accompanying drawing, in which:-
- 120

*Figure 1* is a perspective view of a tree equipped with the lighting system of this invention,

- Figure 2* is a perspective view of a fragment of *Fig. 1* on an enlarged scale,

*Figure 3* is a section through an electric lead showing how a bulb is connected thereto,

- Figure 4* is a view of a modification com-
- 130

prising a branch of an artificial tree in which the conductors of an electric lead are integrally moulded, and

Figure 5 is an exploded view of another embodiment.

Fig. 1 diagrammatically represents an artificial Christmas tree comprising a trunk 1 supported by a base 2 and carrying branches 3 provided with decorative "foliage" 4 consisting of the ends of interwoven narrow strips of metallised plastic foil. Along each branch 3 is secured, as more clearly shown in Fig. 2, an electric lead 5 containing twin conductors 14. Each lead extends to the base of the trunk where all the leads are connected in parallel in an input socket 6. An electric lead 5 also extends to the top of the trunk 1. The leads 5 may be secured to the branches and trunk by spaced ties 7. Current is fed to the harness comprising the leads 5 by a mains transformer 8 which steps down the mains voltage to 12 or 6 volts, the output lead 9 from the transformer being connectable to the socket 6 by a plug 10. The transformer unit may include an overload cut-out resettable by a button 16.

Lighting bulbs 11 are located at desired positions on the tree. As shown in Fig. 3, each bulb comprises a glass envelope 11 containing a filament 12 operable from the low voltage input and having its ends connected to conductive pins 13 secured in or to the glass envelope and projecting a distance apart corresponding to the distance between the conductors 14 in the leads 5. By forcing the pins 13 into the leads 5 to pierce the insulation 15 surrounding the conductors 14, the pins may be brought into contact with and connected across the conductors so that the bulb 11 will light up when current is fed to the harness. Conveniently the conductors 14 are of multi-strand wire to ensure good electrical contact when pierced by a pin 13. Bulbs may be inserted into the leads at any desired positions along the branches and trunk. If one bulb burns out or there is a bad connection, none of the other bulbs is affected. There is no risk of shock or fire, and any number of bulbs can be supplied from a single wiring harness.

When no longer to be displayed, the tree may be stored by folding up the branches with the electric leads still assembled thereto, thus facilitating re-erection when again required for use. If desired the bulbs may be removed during storage.

In a modification the electric leads may themselves be constructed to form the branches and or trunk of a tree. For example, Fig. 4 shows a branch 20 moulded of plastics material with two conductors 21 therethrough with which contact can be made by forcing the pins 13 of the bulbs 11 through the plastic material 20. The branches may be formed or provided with decorative "foliage"

23. If desired the branch may be formed with holes, which may be lined with sockets of insulating or conducting material, into which the pins may be inserted. The branches may be foldable relative to the trunk, or detachable therefrom, in which case the inner ends of the branches may comprise contacts for effecting electrical connection with complementary contacts on the trunk when the branches are assembled thereto.

In the embodiment according to Fig. 5, an artificial Christmas tree has its trunk or stem constructed of a plurality of lengths of tube 30, conveniently of plastics material, which are assembled end-to-end one above the other, by tubular connector sockets 31 (see also Fig. 5a), also conveniently made of plastics material, the number of tubes 30 depending upon the desired height of the tree. Each connector member 31 has five branch sockets 32 of smaller diameter than the tubes 31, which project radially outwards, and slightly upwardly and into which further tubular members 33 are inserted to form the branches of the tree. The lower end of the trunk or stem 30 is inserted in a base 34 which constitutes a housing for a step-down mains transformer or is provided with an electrical socket into which the output from such a transformer can be plugged. The output terminals of the transformer or socket are connected respectively with two bundles 35, 36 of insulated electric wires, the insulation being differently coloured on the wires of the bundles so that pairs of wires, one from each bundle, may be readily selected for threading through the respective branch sockets 32 and into the associated branch tubular member 33 where the wires of a pair are respectively connected to the contacts of lamp sockets 37 disposed at spaced intervals along the length of a branch member 33. Conveniently the branch tubular members are assembled from part-cylindrical portions or halves 33a, 33b to facilitate making the electrical connections to the contacts of the lamp sockets 37 whereafter the two portions of a branch are stuck or otherwise secured together. Lamp bulbs 11 as shown in Fig. 3 are plugged into the respective lamp sockets 37. Or bulbs and sockets with screws, bayonet or other forms of contact may be used. The lengths of the respective pairs of wires may be such as to provide sufficient play to permit the branch members 33 to be withdrawn from their respective branch sockets and laid parallel to the stem 30 when the tree is to be stored.

Appropriate "foliage" may be applied to the stem and branches of the tree.

## CLAIMS

1. A lighting system for natural and artificial trees or plants including a wiring harness comprising a plurality of parallel-connected pairs of insulated conductors respectively ex-

tending along and secured to, wound around, woven in with, moulded in, enclosed within or otherwise assembled to at least some of the branches of the tree or plant, in combination with a plurality of low-voltage electric bulbs of which the contacts are detachably connected to the respective conductors of a pair along a branch either directly or *via* complementary lamp sockets disposed along the branches.

- 10 2. A lighting system according to claim 1, wherein the wiring harness comprises a plurality of electric leads each comprising two elongate conductors insulated from each other by being located in substantially uniformly spaced-apart relation by a covering of insulating material, the two conductors of the respective leads being connected in parallel with each other to a common input and the respective leads extending along and being secured to, woven in with, moulded or enclosed within, or otherwise assembled to at least some of the branches of the tree or plant, and the filaments of the low-voltage electric bulbs are connected across pairs of conducting pins which are adapted to pierce the insulating covering or be inserted through or into pre-formed openings or sockets therein to make electric contact with the pairs of conductors of the leads at desired locations on the tree or plant.

- 30 3. A lighting system according to claim 1, wherein the trunk or stem of an artificial tree or plant comprises a plurality of lengths of tube, which are assembled end-to-end, one above the other, by tubular connector sockets having a plurality, conveniently five, of smaller branch sockets projecting generally radially therearound, and preferably slightly upwardly, into which further tubular members are inserted to form the branches of the tree or plant, each pair of conductors being threaded up the trunk or stem tube and out through different smaller branch sockets into respective branch tubes.

- 45 4. A lighting system according to claim 3, wherein each branch tube is assembled of two part-tubular portions, one or more lamp sockets for detachably receiving the contacts of a bulb being assembled through the wall of at least one of said portions.

- 50 5. A lighting system according to claim 3 or 4, wherein each pair of conductors is formed of individual insulated wires.

6. A lighting system as claimed in any one of the preceding claims, and including a source of low voltage connected to supply current to the harness.

7. A lighting system according to claim 6, wherein the low-voltage source comprises a step-down transformer fed from the mains supply.

8. A lighting system for a tree or plant substantially as described with reference to Figs. 1 to 4 of the drawings.

- 65 9. An artificial Christmas tree equipped

with a lighting system substantially as described with reference to Fig. 5 of the drawings.

- 70 10. A set of parts comprising a wiring harness of parallel-connected pairs of conductors and a plurality of low-voltage bulbs constituting a lighting system for a tree or plant according to claim 1.

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